

Notice of Allowability

Application No.

09/557,250

Examiner

Haresh Patel

Applicant(s)

GOLDICK ET AL.

Art Unit

2154

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 8/13/07.
2. ☒ The allowed claim(s) is/are 2,4-13,17,18,20,23,24 and 26-33.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

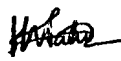
Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>9/10/07</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |


Haresh Patel

EXAMINER'S AMENDMENT

1. Claims 2, 4-13, 17, 18, 20, 23, 24 and 26-33 are subject to examination. Claims 1, 3, 14-16, 19, 21, 22 and 25 are cancelled.
2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.
3. Authorization for this examiner's amendment was given in a telephone interview with Mr. Grzegorz S. Plichta on September 10, 2007.

Amendments to the Specification

4. Please replace title of the specification with the following:

--REGISTERING AND STORING DEPENDENCIES AMONG APPLICATIONS AND OBJECTS IN A COMPUTER SYSTEM AND COMMUNICATING THE DEPENDENCIES TO A RECOVERY OR BACKUP SERVICE--
5. Please amend lines 26 through 30 of page 2 of the specification with the following:

--"Support for Multiple Temporal Snapshots of Same Volume", U.S. Patent Appln. No., 09/505,447, now patent number 6,651,075, filed 2/16/2000, to Cabrera et al., "Kernel-Based Crash-Consistency Coordinator" U.S. Paten Appln. No 09/505,344, now patent number 6,647,473, filed 2/16/00, to Golds et al and "System and Method for Growing Differential File on a Base Volume of a Snapshot", U.S. Patent Appln. No. 09/505,450, now patent number 6,473,775, filed 2/16/00, to Kusters et al. relate to backup processes generally--

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6. Please amend line 25 of page 4 of the specification with the following:

--Appln. No. 09/268,146, now patent number, 6,978,279, filed 03/15/99, to Lomet et al.
describes a technique for utilizing logical--

7. Please replace abstract of the specification as attached.

Amendments to the Claims

8. Please amend claims 4, 13 and 28-30 as attached.

Double Patenting

9. Applicant's remarks dated 8/13/07 and the amendment to the claims with additional limitations including replaced independent claims 1, 16 and 22 with 28, 29 and 30 respectively, submitted on 8/13/07 are acknowledged and hence the double patenting rejections of the previous office action 6/5/2007 are withdrawn.

Allowable Subject Matter

10. Claims 2, 4-13, 17, 18, 20, 23, 24 and 26-33 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Haresh Patel whose telephone number is (571) 272-3973. The

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examiner can normally be reached on Monday, Tuesday, Thursday and Friday from 10:00 am to 8:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn, can be reached at (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Haresh Patel

Haresh Patel

September 10, 2007

**REGISTERING AND STORING DEPENDENCIES AMONG APPLICATIONS
AND OBJECTS IN A COMPUTER SYSTEM AND COMMUNICATING THE
DEPENDENCIES TO A RECOVERY OR BACKUP SERVICE**

ABSTRACT OF THE DISCLOSURE

An application programming interface protocol is provided for making requests to registered applications regarding applications' dependency information so that a table of dependency information relating to a target object can be recursively generated. When all of the applications' dependencies are captured at the same time for given volume(s) or object(s), the entire volume's or object's program and data dependency information may be maintained for the given time. With this dependency information, the computer system advantageously knows not only which files and in which order to freeze or flush files in connection with a backup, such as a snapshot, or restore of given volume(s) or object(s), but also knows which volume(s) or object(s) can be excluded from the freezing process. After a request by a service for application dependency information, the computer system can translate or process dependency information, thereby ordering recovery events over a given set of volumes or objects.

Claim 4 (Currently Amended): The method as recited in claim [[1]] 28, wherein said backup service includes an execution of the freezing of applications in the order reflected by the determined application freeze order.

Claim 13 (Currently Amended): The computer [[-]] readable storage medium having computer-executable instructions for instructing a client computer to perform the acts of a the method recited in claim 28.

Claim 28 (Currently Amended): A method for utilizing applications' state dependency information to efficiently perform a backup service operation in a computer system, comprising the acts of:

registering applications loaded in said computer system with an application dependency application programming interface (API) for communication of application state dependency information among applications, a common software agent, a storage component utilized by said agent, and a backup service;

storing in said storage component said applications' state dependency information;

communicating by said agent, said applications' state dependency information from said storage component to said backup service;

maintaining by said agent, hierarchical application dependencies of said registered applications for backup operation; and

retroactively recovering by said agent, said computer system to a ~~pre-crash~~ pre-crash state after selectively analyzing said state dependency information and determining an application freeze order.

Claim 29 (Currently Amended): An application programming interface (API) embodied in a computer readable storage media having computer executable instructions for use in a computer system, said instructions comprising:

instructions to register applications loaded in said computer system with said API for communication of application state dependency information among applications, a common software agent, a storage component utilized by said agent, and a service;

instructions to store said application state dependency information in said storage component;

instructions to communicate by said agent said application state dependency information from said storage component to said service;

instructions to maintain hierarchical application dependencies of the registered applications for service operations; and

instructions to retroactively recover said computer system to a ~~pre-crash~~ pre-crash state after selectively analyzing said state dependency information and determining an application freeze order.

Claim 30 (Currently Amended): A computer system, comprising:

a plurality of applications loaded and registered in said system, wherein at least one of said applications has at least one external state dependency with other said applications ~~associated therewith~~;

a storage component for storing application state dependency information, wherein said dependency information is

configured to include information about said at least one external state dependency;

an agent that functions according to communication protocols of an application programming interface (API) in said system for processing said at least one application's state dependency information, said application's state dependency information includes information about dependencies among said applications, and said API is configured to communicate said state dependency information among said applications, said agent, said storage component utilized by said agent, and a backup service;

said service ~~that~~ makes requests to said agent for said application's state dependency information; [[,]] said agent collects, stores and packages said application's state dependency information in response to a request by said service, and delivers said application's state dependency information to said service for further processing by said service;

said agent maintains hierarchical application dependencies of said registered applications for a backup operation, and retroactively recovers said computer system to a ~~pre-eash~~ pre-

crash state after selectively analyzing said state dependency
information and determining an application freeze order.